

NASA/SP—1998-7011/SUPPL475  
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# **AEROSPACE MEDICINE AND BIOLOGY**

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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# Typical Report Citation and Abstract

- ❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
- ❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
- ❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
- ❹ Mar. 1996; 130p; In English
- ❺ Contract(s)/Grant(s): RTOP 505-68-70-04
- ❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
- ❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.
- ❽ Author
- ❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

## Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
8. Abstract Author
9. Subject Terms

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# AEROSPACE MEDICINE AND BIOLOGY

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*A Continuing Bibliography (Suppl. 475)*

OCTOBER 5, 1998

## 51

### LIFE SCIENCES (GENERAL)

**19980211158** California Univ., San Francisco, CA USA

**Fludrocortisone: Role in Central Regulation of Fluid Balance** *Final Report, 1 Jul. 1993 - 15 Jan. 1996*

Dallman, M. F., California Univ., USA; 1996; 12p; In English

Contract(s)/Grant(s): NCC2-764

Report No.(s): NASA/CR-1996-206754; NAS 1.26:206754; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We have performed 7 experiments in rats on the effects of systemic treatment with fludrocortisone (9a-FF) given in a variety of doses over a variety of times, in the AM and in the PM. These experiments were designed to determine the best treatment protocol to use in the head-down rat model studies which were performed at NASA-Ames Research Center during the final year. The results of the experiments in non-stressed rats have been, on the whole, disappointing in that we have so far been unable to obtain direct evidence that the 9a-FF acts as a mineralocorticoid. In the ultimate experiments using control and suspended rats, we showed mineralocorticoid and glucocorticoid effects of 9aFF. However, suspension served in our rats as a chronic stressor when they were examined 5 d after the onset of treatment.

Derived from text

*Cortisone; Rats; Adrenal Gland; Body Fluids; Hormone Metabolisms*

**19980211259** Osaka Univ., Graduate School of Science, Osaka Japan

**Spin glass model for biological systems**

Tokita, Keiichiro, Osaka Univ., Japan; 1995, pp. 162; In English; Also announced as 19980211166; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche; US Sales Only; US Sales Only

In order to explain mass extinctions by internal dynamics, a general mathematical model of ecosystems with spin-glass-like random interaction was constructed. It was assumed that the interaction coefficients for a new ecosystem produced by exogenous shock could be written in the form of a random matrix, and an extinction threshold was adopted in the replicator equations. Gaussian random numbers were assigned to the interspecies interaction coefficients. If initial number of species, random matrix and extinction threshold were fixed, dynamics had only one attractor except few cases. This is clearly in contrast to the case of dynamics without extinction. Average final variety over samples of random matrix was independent of the initial number of species. Avalanche of mass extinction began after some induction time.

NASDA

*Spin Glass; Ecosystems; Extinction; Bionics; Mathematical Models*

**19980211331** New Energy and Industrial Technology Development Organization, Tokyo, Japan

**Leading research on cell proliferation regulation technology** *Saibo zoshoku seigyō gijutsu no sendo kenkyū*

Mar. 1997; 132p; In Japanese

Report No.(s): NEDO-PR-9610; DE98-745396; No Copyright; Avail: Issuing Activity (Nat'l Technical Information Service (NTIS)), Microfiche

For developing intelligent material, animal test alternative model, bio-cell analysis equipment, self-controlling bio-reactor and medical material, development of functional cells was studied by cell proliferation regulation technology. In fiscal 1996, the expression analysis and separation technology of specific gene for cell proliferation, and the intracellular regulation technology were surveyed from the viewpoint of intracellular regulation. The cell proliferation regulation technology by specific regulating material of cells, extracellular matrix, coculture system and embryonic cell was surveyed from the viewpoint of extracellular regulation. In addition, based on these survey results, new cell culture/analysis technology, new bio-material, artificial organ system,

energy saving bio-reactor, environment purification microorganism, and animal test alternative model were surveyed as applications to industrial basic technologies from a long-term viewpoint. The approach to cell proliferation regulation requires preparation of a concrete proliferation regulation technology system of cells, and concrete application targets.

DOE

*Cells (Biology); Targets; Animals; Smart Materials; Microorganisms; Reactor Materials; Bioreactors; Biotechnology; Control*

**19980211479** Energia Nucleare e Delle Energie Alternative, Dipt. Innovazione, Rome, Italy

**Biotechnological innovation impacts, social and ethical aspects and public acceptability** *Sicurezza, implicazioni etico-sociali e percezione pubblica delle biotecnologie*

Capuano, V., Energia Nucleare e Delle Energie Alternative, Italy; Nov. 1997; ISSN 1120-5571; 78p; In Italian

Report No.(s): ENEA-RT-INN-97-26; DE98-759694; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

Biotechnology is a highly distinctive area of scientific activity and its applications can strongly influence human life. Biotechnological innovations impact on sanitary, environmental, social, ethical and economic aspects and it is particularly important a greater public understanding of biotechnology issues in the view of increasing its acceptability. Knowledge and acceptance do not go always in the same direction, as the last is influenced by various complex factors, but without a knowledgeable public there can be no effective democratic agreement. So it appears important that scientific community and industry can promote and diffuse more knowledge among citizens and consumers, taking into account also of social and ethical issues raised by public and public interest groups. In this report bio safety of biotechnology applications and social and ethical issues are analyzed. They receive much attention in the discussion in the biotechnology arena (scientists, industry, institutions and the public). In particular health and environmental risks, gene therapy, transgenic animals, patent issues and genetic resources access, consumers rights are considered. Since the media are central to the dissemination of information and views about science, it has been evidenced their role, in addition to a short analysis of public perception and communication strategies.

DOE

*Biotechnology; Genetics; Health*

**19980211497** Georgia Univ., Research Foundation, Athens, GA USA

**Nitrogen control of chloroplast differentiation** *Final Report*

Schmidt, G. W., Georgia Univ., USA; [1998]; 3p; In English

Contract(s)/Grant(s): DE-FG05-93ER-20100

Report No.(s): DOE/ER/20100-T1; DE98-005187; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This project was directed toward understanding at the physiological, biochemical and molecular levels of how photosynthetic organisms adapt to long-term nitrogen-deficiency conditions is quite incomplete even though limitation of this nutrient is the most commonly restricts plant growth and development. For our work on this problem, the unicellular green alga, *Chlamydomonas reinhardtii*, was grown in continuous cultures in which steady-state levels of nitrogen can be precisely controlled. N-limited cells exhibit the classical symptoms of deficiency of this nutrient, chlorosis and slow growth rates, and respond to nitrogen provision by rapid greening and chloroplast differentiation. We have addressed three aspects of this problem: (1) the regulation of pigment synthesis; (2) control of expression of nuclear genes encoding photosynthetic proteins; (3) changes in metabolic and electron transport pathways that enable sustained CO<sub>2</sub> fixation even though they cannot be readily converted into amino and nucleic acids. For the last, principle components are: (a) enhanced mitochondrial respiratory activity intimately associated with photosynthesates, and (b) the occurrence in thylakoids of a supplemental electron transport pathway that facilitates reduction of the plastoquinone pool. Together, these distinguishing features of N-limited cells are likely to enable cell survival, especially under conditions of high irradiance stress.

DOE

*Nitrogen; Chloroplasts; Physiology; Biochemistry; Photosynthesis; Organisms; Biosynthesis*

**19980211512** Energia Nucleare e Delle Energie Alternative, Dipt. Innovazione, Rome, Italy

**Laboratory LiF characterization of different phytoplankton species originating harmful blooms**

Barbini, R., Energia Nucleare e Delle Energie Alternative, Italy; Colao, F., Energia Nucleare e Delle Energie Alternative, Italy;

Fantoni, R., Energia Nucleare e Delle Energie Alternative, Italy; Palucci, A., Energia Nucleare e Delle Energie Alternative, Italy;

Ribezzo, S., Energia Nucleare e Delle Energie Alternative, Italy; Micheli, C., Energia Nucleare e Delle Energie Alternative, Italy;

Nov. 1997; ISSN 1120-5571; 31p; In English



Report No.(s): ENEA-RT-INN-97-21; DE98-759690; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

A systematic laboratory characterization of different phytoplankton cultures has been performed in combination with LiF (Laser Induced Fluorescence) measurements aimed to investigate the possibility of their remote monitoring by means of lidar fluoro sensor systems. Cultures of microalgae characterized by different pigment contents have been analyzed in the visible region upon UV laser excitation. High resolution laboratory spectra have been measured in order to obtain the fingerprint of each species. Emission wavelength related to the main pigments contribution have been identified. Detection limits of the emitted red chlorophyll signal have been evaluated for the different species after dilution in the culture medium and in real sea water. Prior to the LiF excitation aimed to the remote characterization the algal cultures were morphologically analyzed by fluorescence and scanning electron microscopy. Furthermore the relevant cell number was counted for biomass estimation, and the chlorophylls content was determined by different chemical methods.

DOE

*Scanning Electron Microscopy; Laser Induced Fluorescence; Chlorophylls; Algae; Phytoplankton*

## 52

### AEROSPACE MEDICINE

*Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.*

**19980210921** Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada

#### **Recommendations to Enhance Spatial Disorientation Training for the Canadian Forces**

Cheung, Bob, Defence and Civil Inst. of Environmental Medicine, Canada; Feb. 1998; 27p; In English

Report No.(s): AD-A345707; DCIEM-98-R-32; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Spatial disorientation (SD) in flight wastes millions of dollars worth of defence capability and continues to kill aircrew. A number of CF (Canadian Forces) surveys have identified SD as the most detrimental of all listed aircraft and human factor issues in terms of its effects on flight safety and operational effectiveness. Two retrospective studies by Hartzell and Cheung et al. confirmed that SD was a significant contributing factor in 12 (between 1968-78) and 14 (between 1982-92) accidents respectively. Following a series of SD implicated mishaps in the CF-18 between 1986-90; the Commander of AIRCOM directed the initiation of ground-based disorientation training and the acquisition of an effective ground-based SD trainer. However, without a recent mishap, on-going fiscal restraint and other factors, the support and resources for acquiring an effective ground-based trainer are not available. In order to solve the SD problem, we believe that research on underlying mechanisms is productive and that hardware improvements will eventually provide substantial additional protection. Research and technological improvements that deal with SD will require a great deal of effort and money to implement and is a distant goal. For the near term, the only practical approach is to enhance SD awareness training for pilots and should be addressed without delay. This report reviews current SD training practices in the CF, and makes recommendations to enhance spatial disorientation training on the ground and in-flight. It is hoped that this report will generate continued discussions among pilots, aeromedical instructors, flight surgeons and research scientists in maintaining progress towards mounting an attack on SD.

DTIC

*Disorientation; Training Devices; Flight Crews; Flight Safety; System Effectiveness; Spatial Distribution*

**19980210952** Medical Coll. of Wisconsin, Milwaukee, WI USA

#### **Frontiers in Head and Neck Trauma: Clinical and Biomechanical Final Report, 1 Sep. 1996 - 19 Jun. 1998**

Yoganandan, Narayan, Medical Coll. of Wisconsin, USA; Pintar, Frank A., Medical Coll. of Wisconsin, USA; Larson, Sanford J., Medical Coll. of Wisconsin, USA; Jun. 19, 1998; 246p; In English

Contract(s)/Grant(s): N00014-96-1-1234

Report No.(s): AD-A348631; MCW-NS-980615; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

Clinical and biomedical aspects of head and neck injuries are covered in this presentation. Recent research stemming from laboratory-driven experimental and mathematical models, and clinical and epidemiological investigations are discussed. Topics covered include the basic anatomy of the head and neck of the pediatric and adult human population; the effects of the presence of uncovertebral joints in the adult human neck; and radiographic, computed tomography and magnetic resonance imaging of craniocerebral and cervical trauma. An evaluation is made of the Hybrid III anthropomorphic test device with the human neck structure. Inertial loading of the human neck and its implications in the production of whiplash injuries are given. Mathematical modeling describes continuum mechanics-type buckling models, and numerical finite element techniques to evaluate the effect

of clinical procedures such as surgery and stabilization. Instrumentation techniques are discussed for the upper and lower cervical spine. Head and neck injury issues in Naval Aviation are also presented.

DTIC

*Magnetic Resonance; Tomography; Spine; Military Aviation; Imaging Techniques*

**19980210954** Pennsylvania Univ., Philadelphia, PA USA

**Evaluation of Muscle Function in Persian Gulf Veterans** *Annual Report, 15 Jun. 1996 - 14 Jun 1997*

Vandenborne, Krista, Pennsylvania Univ., USA; Jul. 1997; 16p; In English

Contract(s)/Grant(s): DAMD17-96-C-6055

Report No.(s): AD-A348644; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In an effort to investigate the etiology responsible for the ongoing chronic fatigue (CF) and muscle weakness in veterans with Persian Gulf (PG) illness we are performing a comprehensive evaluation of skeletal muscle in PG veterans with CF and healthy control veterans. Preliminary evaluation of 18 veterans with CF and 7 healthy control veterans shows evidence that muscle function is impaired in veterans with PG illness. Specifically, a significant decrease was found in the mitochondrial ATP producing capacity in Gulf veterans with CF compared to healthy veterans. MRI measurements show that there is no difference in the cross-sectional area of the calf muscles of both populations, indicating that the decrease in mitochondrial function of the veterans with CF is not simply the result of severe disuse or deconditioning. In addition, while the relative fatigability of skeletal muscle in the healthy veterans and veterans with CF is not different, the total amount of work that can be performed is significantly higher in the healthy veterans. Further examination of skeletal muscle using a combination of electrical stimulation, muscle biopsies and EMG is being performed to confirm the myopathic origin of chronic fatigue in PG illness.

DTIC

*Musculoskeletal System; Adenosine Triphosphate; Persian Gulf; Mitochondria; Electromyography*

**19980210970** Iowa Univ., Iowa City, IA USA

**Neural Control Mechanisms and Body Fluid Homeostasis** *Interim Report, 1 Apr. 1995 - 31 Mar. 1998*

Johnson, Alan Kim, Iowa Univ., USA; 1998; 5p; In English

Contract(s)/Grant(s): NAG5-6171

Report No.(s): NASA/CR-1998-208294; NAS 1.26:208294; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The goal of the proposed research was to study the nature of afferent signals to the brain that reflect the status of body fluid balance and to investigate the central neural mechanisms that process this information for the activation of response systems which restore body fluid homeostasis. That is, in the face of loss of fluids from intracellular or extracellular fluid compartments, animals seek and ingest water and ionic solutions (particularly Na<sup>+</sup>) solutions to restore the intracellular and extracellular spaces. Over recent years, our laboratory has generated a substantial body of information indicating that: (1) a fall in systemic arterial pressure facilitates the ingestion of rehydrating solutions and (2) that the actions of brain amine systems (e.g., norepinephrine; serotonin) are critical for precise correction of fluid losses. Because both acute and chronic dehydration are associated with physiological stresses, such as exercise and sustained exposure to microgravity, the present research will aid in achieving a better understanding of how vital information is handled by the nervous system for maintenance of the body's fluid matrix which is critical for health and well-being.

Author

*Nervous System; Body Fluids; Homeostasis; Data Bases*

**19980211066** Boston Univ., School of Medicine, Boston, MA USA

**Neuropsychological Functioning in Persian Gulf War Era Veterans** *Annual Report, 1 May 1997 - 30 Apr. 1998*

White, Roberta F., Boston Univ., USA; May 1998; 28p; In English

Contract(s)/Grant(s): DAMD17-96-1-6043

Report No.(s): AD-A347712; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Persian Gulf War (PGW) veterans have reported a constellation of health symptoms referred to as Gulf War Syndrome. Suggested causes of these symptoms include exposure to environmental hazards and biological or chemical warfare agents. Some of the symptoms reported overlap with those of post-traumatic stress disorder (PTSD), Multiple Chemical Sensitivity (MCS) or chronic fatigue syndrome (CFS). Both exposure to neurotoxins and the disorders noted above are known to produce cognitive impairments. This study evaluates the neuropsychological functioning of PGW era veterans who are seeking treatment or evaluation for any type of health or adjustment complaint. PGW deployed patients will be compared with non-deployed patients. These subjects will also be compared with subjects from a (non-treatment seeking) research sample of PGW veterans. All patients and research subjects will additionally be administered a standardized set of questionnaires and interviews to identify their health

symptoms including their physical and mental health condition. These instruments permit diagnosis of PTSD, MCS, CFS and other psychiatric disorders. The purpose of these comparisons is to isolate factors that differentiate PGW veterans who are seeking treatment for health complaints from their treatment seeking counterparts who are not PGW veterans.

DTIC

*Neurology; Exposure; Mental Health; Signs and Symptoms; Mental Performance*

**19980211307** New Energy and Industrial Technology Development Organization, Tokyo, Japan

**Leading research on brain functional information processing** *No kino joho shori no sendo kenkyu*

Mar. 1997; 184p; In Japanese

Report No.(s): NEDO-PR-9609; DE98-745395; No Copyright; Avail: Issuing Activity (Nat'l Technical Information Service (NTIS)), Microfiche

This research aims at searching the concept of an information processing device with a fully different architecture from a previous ones based on the study on human brain function, sense and perception, and developing the basic fabrication technology for such system, and realizing the human-like information processing mechanism of memorization, learning, association, perception, intuition and value judgement. As an approach deriving biological and technological models from experimental brain studies, the model was derived from the brain functional information processing based on brain development/differentiation mechanism, the control mechanism/material of brain activities, and the knowledge obtained from brain measurement and study. In addition, for understanding a brain oscillation phenomenon by computational neuroscience, the cerebral cortex neural network model composed of realistic neuron models was proposed. Evaluation of the previous large-scale neural network chip system showed its ability of learning and fast processing, however, the next-generation brain computer requires further R and D of some novel architecture, device and system.

DOE

*Brain; Information; Human Performance; Data Processing; Computers; Genetic Engineering; Architecture (Computers)*

**19980211438** Institute for Human Factors TNO, Soesterberg, Netherlands

**Thermal Comfort in a Temperature Range from minus 13 to plus 35 C Relation to the Performed Work** *Final Report Thermisch comfort en een temperatuur-range van -13 tot +35 deg C in relatie tot de verrichte arbeid*

Heus, R., Institute for Human Factors TNO, Netherlands; Kistemaker, J. A., Institute for Human Factors TNO, Netherlands; Havenith, G., Institute for Human Factors TNO, Netherlands; Dec. 04, 1997; 27p; In English

Contract(s)/Grant(s): A93/KL/317

Report No.(s): TNO-TM-97-A-75; TD97-0260; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg, The Netherlands); US Sales Only, Hardcopy, Microfiche

Thermal comfort of humans is determined by subjective sensations of temperature, humidity and comfort. These subjective sensations can partly be explained by physiological and physical parameters. A large literature review has led to formulas for temperature and humidity sensations. In this study, these formulas have been validated under experimental conditions and besides we searched for a formula for comfort sensation in terms of physiological parameters. In three climates (-13, 13 and 35 C) male and female subjects exercised on four levels (rest, fight, moderate and heavy work). The subjects were asked to give their continuous evaluations of temperature, humidity and comfort. We measured body temperatures and metabolism of the subjects and the environmental parameters. These data were used to validate the formulas for temperature and humidity sensations and stepwise regression analysis was used to find a formula for comfort sensation. The results of this study showed that total temperature sensation can be predicted by rectal temperature, temperature of the extremities and environmental temperature and that the proposed formula can be validated partly, but that the model can be simplified by only using the metabolic rate and the temperature of the extremities in the formula. Local sensations of temperature can be explained by only the local skin temperature. The psychophysical law is a less good predictor for local temperature sensation. The humidity formula could also be validated very well by explaining the subjective humidity by relative humidity of the skin, sweat production and rectal temperature. The present data set was not sufficient to explain comfort, but thermal comfort can be explained by thermal and humidity sensations. The data set offers lots of possibilities for further analyses.

Author

*Thermal Comfort; Body Temperature; Humidity; Physiology*

**19980211488** British Columbia Univ., B.C. Office of Health Technology Assessment, Vancouver, British Columbia Canada

**Bone Mineral Density Testing: Does the Evidence Support its Selective use in Well Women?**

Green, C. J., British Columbia Univ., Canada; Bassett, K., British Columbia Univ., Canada; Foerster, V., British Columbia Univ., Canada; Kazanjian, A., British Columbia Univ., Canada; Dec. 1997; 192p; In English

Report No.(s): BCOHTA-97:2T; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Primary care physicians, perimenopausal women, and health policy makers currently are or soon will be facing a key decision regarding Bone Mineral Density (BMD) testing: Should all, a selected subset, or no well women have BMD testing at or near the time of menopause? This decision is critical because it will determine both the future breadth of BMD application across, and its duration of use within, the female population. The potential application varies widely, ranging from all women from 45-50 years of age until death, to no well woman at any age. The decision will not be easy. Physicians, women, and health policy makers must situate BMD testing, within the natural aging process, relate it to medical management schemes designed to reduce fracture rates in seniors, and evaluate it in relation to controversial drug treatment effectiveness. In addition, policy makers must weigh the costs and benefits of BMD testing against alternate uses of limited health care funds, including other programs designed to improve women's health. And, all this must be achieved in the face of the intense marketing pressure from the drug and device industry. The decision regarding how to use BMD testing, will be difficult enough without introducing misconceptions about the technology. For example, no one involved in the decision should believe that improvements in BMD technical accuracy and replicability alone will translate into improved patient outcome. Technical accuracy refers to the degree to which BMD measurements represent the true BMD value of the site being measured. Replicability refers to the extent to which the same value is obtained with repeat measurements of the same site. Accuracy and replicability are important issues but mean little without evidence of validity; in this instance, evidence establishing a link between BMD testing and improved patient outcome. Another misconception is that drug treatment increasing BMD will translate into improved patient outcome. Treatment effectiveness also depends on the extent to which therapy is applied to the correct individuals, taken for an adequate period of time and results in an actual decrease in fracture rates. Of all the ongoing misconceptions, arguably the most insidious is one currently promoted by the drug and device industry and its representatives; that is, that 'selective' as opposed to 'whole population' screening of women is a reasonable way to proceed. This approach is dangerous because it seems reasonable. It seems to involve judicious use of scarce health resources in general and of this technology in particular. In addition, it seems to reflect and support the interests of women, especially those considered at elevated risk for what are often debilitating fractures. Furthermore, and most pernicious, it is likely to seem reasonable to clinicians.

Derived from text

*Bone Demineralization; Bone Mineral Content; Females; Fractures (Materials); Public Health; Patients; Policies*

**19980214902** Naval Health Research Center, San Diego, CA USA

**Environmental Heat Transfer to a Microclimate Cooling System During Heat Exposure Final Report**

Canine, Katherine, Naval Health Research Center, USA; Feb. 02, 1998; 20p; In English

Report No.(s): AD-A349469; NHRC-98-2; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Heat transfer from the environment ( $Q(\text{env})$ ) to a water-based microclimate cooling system (MCS), operated at four temperatures of water ( $T(w)$ ), was measured utilizing a rubber manikin outfitted in coveralls and chemical protective clothing.  $Q(\text{env})$  increased in direct proportion to the difference in  $T(w)$  and ambient temperature ( $T(a)$ ). Good linear models were found for predicting  $Q(\text{env})$  when  $T(a)$  or temperature between clothing layers and  $T(w)$  are known. These models can be used in future physiological tests to apportion heat transfer between the environment and the body.  $Q(\text{env})$  was substantial, greater than 100 w at the lowest temperature of water, even when insulated from the environment. Because many MCSs have limited cooling capacities, it is important to reduce  $Q(\text{env})$ . Thus, it is advantageous to wear insulating garments in hot environments when microclimate cooling is used.

DTIC

*Heat Transfer; Microclimatology; Environment Effects; Cooling Systems; Temperature Effects*

## 53

### BEHAVIORAL SCIENCES

*Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.*

**19980214924** Columbia Univ., Dept. of Psychology, New York, NY USA

**DURIP97 Human Cognitive Performance in the Interpretation of False Color Non-Literal Imagery Final Report, 1 Apr. 1997 - 31 Aug. 1998**

Markman, Arthur B., Columbia Univ., USA; Apr. 1997; 2p; In English

Contract(s)/Grant(s): F49620-97-1-0155; AF Proj. 3484

Report No.(s): AD-A346277; AFRL-SR-BL-TR-98-0493; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche



The purpose of this grant was to purchase equipment to enable us to study the influence of people's beliefs about thermodynamics and the influence of those beliefs on their ability to interpret infrared images. For this project, we purchased an Inframetrics Thermacam PM250 to collect thermal images. In addition, we purchased a Compaq Deskpro personal computer for processing the images. The computer was used to run a variety of images processing programs including Thermonitor. The Thermacam stores both video and still picture output.

DTIC

*Mental Performance; Cognition; Images; Pattern Recognition; Visual Perception; Image Processing; Infrared Imagery; Color*

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### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

*Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.*

**19980210877** Sapient Inst., Houston, TX USA

**Biochemical Capture and Removal of Carbon Dioxide, 1 Aug. 1995 - 31 Jul. 1997**

Trachtenberg, Michael C., Sapient Inst., USA; Jun. 06, 1998; 7p; In English

Contract(s)/Grant(s): NAGw-4850

Report No.(s): NASA/CR-1998-208214; NAS 1.26:208214; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We devised an enzyme-based facilitated transport membrane bioreactor system to selectively remove carbon dioxide (CO<sub>2</sub>) from the space station environment. We developed and expressed site-directed enzyme mutants for CO<sub>2</sub> capture. Enzyme kinetics showed the mutants to be almost identical to the wild type save at higher pH. Both native enzyme and mutant enzymes were immobilized to different supports including nylons, glasses, sepharose, methacrylate, titanium and nickel. Mutant enzyme could be attached and removed from metal ligand supports and the supports reused at least five times. Membrane systems were constructed to test CO<sub>2</sub> selectivity. These included proteic membranes, thin liquid films and enzyme-immobilized teflon membranes. Selectivity ratios of more than 200:1 were obtained for CO<sub>2</sub> versus oxygen with CO<sub>2</sub> at 0.1%. The data indicate that a membrane based bioreactor can be constructed which could bring CO<sub>2</sub> levels close to Earth.

Author

*Bioreactors; Carbon Dioxide; Removal; Membranes*

**19980210898** Trip-A-Larm, Deerfield Beach, FL USA

**Loss-Prevention and Risk-Mitigation by Reducing False-Alarms in Equipment Protection Systems**

Corso, Philip P., Trip-A-Larm, USA; Jan. 1998; 12p; In English

Report No.(s): AD-A347812; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Like death and taxes Equipment Protection System failures (alarms) are undesirable, unpredictable, unwarranted, and unexplainable. 95% of industrial alarms are false, 99% in aircraft, and 99.9% in security systems. They excite management, incite environmentalists, spur regulatory agencies, and frighten many. Product loss and wasted resources are obvious consequences. Not so obvious is the negative impact on safety. Fail-safe... shutdown upon failure... doesn't make the situation safer. Instead, there's a high-risk of damage or catastrophe during restart.

DTIC

*Losses; Prevention; Warning Systems; System Failures; Fail-Safe Systems*

**19980210972** Institute for Human Factors TNO, Soesterberg, Netherlands

**Difference Between Manual Anthropometric Measurements and Anthropometric Measures Derived Manually from Whole Body Scans: A Pilot Study Interim Report**

Daanen, H. A. M., Institute for Human Factors TNO, Netherlands; Brunsman, M. A., Air Force Research Lab., USA; Jan. 22, 1998; 12p; In English

Contract(s)/Grant(s): A96/KL/302; TNO Proj. 789.1

Report No.(s): TD98-0008; TNO-TM-98-A004; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg, The Netherlands); US Sales Only, Hardcopy, Microfiche

Fifteen anthropometric measures of six subjects were determined in two ways: using traditional standardized manual measurements and using manual retrieval of the measures from a whole body scan. Markers were applied to the body prior to scanning. In the scan image the markers were identified manually by manipulating the scan image. The stature and circumference yielded higher values when derived from the scanned image. Likely explanations for these differences are, respectively, the bald cap on

the head which increases the stature and the absence of soft tissue compression in the determination of the anthropometric measures from the scan. The difference between the two methods is dependent on the measurement location: the axilla height shows differences of up to 36 mm, while the differences in calf circumference never exceed 7 mm. Current clothing sizes are based on traditional body measures. The systematic deviation found in this study between traditional and scan measurements has to be taken into account when whole body scanners are used to determine the body dimensions. A correction factor can be used to establish the correct link between body measures and clothing sizes.

Author

*Anthropometry; Size Determination; Body Measurement (Biology)*

**19980211062** Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA

**A Comparison of Various Types of Head-Related Transfer Functions for 3-D Sound in the Virtual Environment *Final Report***

Savick, Douglas S., Army Research Lab., USA; May 1998; 24p; In English

Contract(s)/Grant(s): Proj-1L162716AH70

Report No.(s): AD-A347740; ARL-TR-1605; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Simulation using virtual reality (VR) is becoming an effective tool for the Army in training soldiers to do their required tasks. In VR, the human operator can interact with a wide variety of computer generated worlds developed from real or imaginary scenarios or both. The training that a soldier receives by simulation is usually cost effective to the Army and in a number of cases is safer for the individual than training in the real environment. Three dimensional (3-D) sound in the virtual environment (VE) provides a more realistic simulation of acoustic environments compared to diotic (mono) or dichotic (stereo) sound presentation. The major benefit of using 3-D sound is that an individual can determine the sound source direction. When sounds that are perceived to have direction and sights that represent virtual objects that produce the sounds are provided through a head mounted display, a person can monitor and identify sources of information from all possible locations. The purpose of this study was to determine if 3-D sound generated by a 3-D sound system could enhance the realism or fidelity of the VE. The main objective of the study was to determine if an individual could distinguish the direction of a sound source within a reasonable degree of accuracy. Three dimensional sound is produced by using a mathematical representation of the filtering characteristics of the pinnae provided through Head Related Transfer Functions (HRTFs). The HRTFs can be developed by recording a generated broadband sound using a probe microphone in the ear canal and subsequently dividing the Fourier transform of the recorded sound by that of the generated sound. When digital filtering techniques are used, HRTFs can be applied to sounds through headphones. When an arbitrary sound is filtered with HRTF based filters, the sound should appear to come from specified virtual locations outside the earphones.

DTIC

*Auditory Signals; Auditory Perception; Fourier Transformation; Transfer Functions; Acoustic Simulation; Education*

**19980211324** Department of Energy, Richland, WA USA

**Portable Oxygen Generation for Medical Applications *Final Report, 8 May 1996 - 1 Jul. 1997***

Armstrong, Timothy R., Department of Energy, USA; Jul. 1997; 44p; In English

Contract(s)/Grant(s): MIPR-96MM6730

Report No.(s): AD-A346676; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A prototypical high-temperature planar oxygen generator was developed within one year. This generator utilizes yttria stabilized zirconia electrolyte and doped lanthanum manganite as the electrodes and separator plate. Several stack (1 to 3- cell) were constructed and tested. The tests demonstrated that: (1) all 25 sq cm of the active area was operational, (2) the cells possessed a low area specific resistance that improved with time, and (3) stack power consumption decreased with time without affecting oxygen output. Important accomplishments were achieved in the areas of separator plate fabrication, metallic seal development, and stack assembly and testing.

DTIC

*Portable Equipment; Medical Services; Oxygen Production; Oxygen; Gas Generators*

**19980211458** NASA Marshall Space Flight Center, Huntsville, AL USA

**Life Testing of the Vapor Compression Distillation/Urine Processing Assembly (VCD/UPA) at the Marshall Space Flight Center (1993 to 1997) *Final Report***

Wieland, P., NASA Marshall Space Flight Center, USA; Hutchens, C., NASA Marshall Space Flight Center, USA; Long, D., NASA Marshall Space Flight Center, USA; Salyer, B., ION Electronics, USA; Aug. 1998; 76p; In English

Report No.(s): NASA/TM-1998-208539; M-887; NAS 1.15:208539; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Wastewater and urine generated on the International Space Station will be processed to recover pure water using vapor compression distillation (VCD). To verify the long-term reliability and performance of the VCD Urine Processor Assembly (UPA), life testing was performed at the Marshall Space Flight Center (MSFC) from January 1993 to April 1996. Two UPA'S, the VCD-5 and VCD-5A, were tested for 204 days and 665 days, respectively. The compressor gears and the distillation centrifuge drive belt were found to have operating lives of approximately 4,800 hours, equivalent to 3.9 years of operation on ISS for a crew of three at an average processing rate of 1.76 kg/h (3.97 lb/h). Precise alignment of the flex-splines of the fluids and purge pump motor drives is essential to avoid premature failure after about 400 hours of operation. Results indicate that, with some design and procedural modifications and suitable quality control, the required performance and operational life can be met with the VCD/UPA.

Author

*Service Life; Distillation; Waste Water; Urine*

**19980213261** Air Force Operational Test and Evaluation Center, Kirtland AFB, NM USA

**Advanced Aircrew Oxygen Mask Insert Evaluation Interim Report, Feb. 1996 - Jan. 1998**

Liptak, Lynda, Air Force Operational Test and Evaluation Center, USA; Jun. 1998; 41p; In English

Contract(s)/Grant(s): Proj-2830

Report No.(s): AD-A349018; AFRL-HE-BR-TR-1998-0043; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Crew Technology Division of Armstrong laboratory is developing an insert for the MBU-20/P aircrew oxygen mask. The insert is placed inside the mask to enhance comfort and seal at high mask cavity pressures. The Air Force Operational Test and Evaluation Center, Rapid Test and Evaluation Directorate (AFOTEC/TA), conducted this evaluation of prototype mask inserts using Air National Guard pilots flying training sortics in F-16 aircraft. The evaluation addresses the operational use of an aircrew oxygen mask insert. The objective was to evaluate mask comfort and mask seal. A re-evaluation questionnaire was designed to assess the comfort and seal of the masks without the insert. A post-evaluation questionnaire addressed the comfort and seal of the mask with the insert. It was planned that each pilot would fly with the insert for at least two sortics. Each pilot had their original mask without insert and an unmodified mask with insert so they could swap masks between sortics and evaluate the seal and comfort of the altered mask. Pilots answered questionnaires as soon as possible after the last flights. Eighteen pilots evaluated the insert. Five pilots reported previous seal problems. All five pilots indicated the insert improved the mask seal and they would continue using the insert. However, most pilots indicated there was a problem with the comfort of the mask with the insert. There was an insufficient sample size to make a statistical determination of the mask insert improvement. Seven of 18 pilots stated they would continue to use the mask insert as it improved the mask seal. However, these pilots were split on the issue of improved comfort, and half reported that comfort decreased with the insert.

DTIC

*Helmets; Oxygen Masks; Evaluation; Product Development; Aircraft Pilots*

**19980213277** Department of the Navy, Washington, DC USA

**Back-Reinforced Two-Piece Upper Torso Assembly for Articulated One-Atmosphere Diving Suit**

Hughes, Robert J., Inventor, Department of the Navy, USA; Mar. 03, 1998; 7p; In English; Supersedes US-Patent-Appl-SN-679839

Patent Info.: Filed 15 Jul. 1996; US-Patent-Appl-SN-679839; US-Patent-5,722,090

Report No.(s): AD-D018977; No Copyright; Avail: US Patent and Trademark Office, Microfiche

A back-reinforced two-piece upper torso assembly for an articulated diving suit. The upper torso assembly includes a lower hollow rigid body of rounded shape for housing a diver's upper trunk, an upper hollow rigid body of rounded shape for housing a diver's head and being seated upon the lower hollow rigid body, and a clamping and sealing mechanism releasably coupling the upper hollow rigid body to the lower hollow rigid body about adjacent seated portions thereof so as to form a watertight joint therebetween wherein the upper hollow rigid body can rotate relative to the lower hollow rigid body. The upper torso assembly also includes a reinforcement structure connecting the upper hollow rigid body to the lower hollow rigid body along adjacent rear portions thereof so as to permit a lifting load applied to the assembly during water entry and exit to transfer to the lower hollow rigid body in such manner as to avoid stressing the watertight joint therebetween.

DTIC

*Torso; Diving (Underwater); Suits; Water*

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